Background of the class

My class is a general education second grade of twenty-four students. I have a student teacher. This year we have studied nature in the city and rocks, among other things. The students were very motivated to learn about animals in the city and also enjoyed the rock unit. The computer teacher collaborated with me to do a research project on rocks and they all loved learning about pumice, the porous rock that floats. We also worked with Landmark West to learn about the brownstones of the Upper West Side. They became very aware of rock as a building material, including the old bluestone sidewalks, concrete and brick. They have the necessary background knowledge for understanding the concept of pervious and impervious surfaces.

Teacher: Sarah Bassett

Grade: 2

Subject: Science, Social Studies, Writing

Class organization: whole class, working in partnerships

Aim/Objective: To learn how the surface of the earth affects the water cycle and how much water is available to us, and to learn about how wetlands can be a buffer that protects humans from the effects of storms.

Common Core State Standard: W8: With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Professional Learning Standard: Domain 3: Instruction, Component 3c: engaging students in learning.

Materials: $1 rectangular paint roller pans with bumpy surfaces and basins, large sponges (without scrubby sides), watering cans (to make it rain) white board and chalk slates, stopwatches, sharpies, blue food coloring, Skittles, gravel, 10x10 grid paper.

Vocabulary: paving, impervious, pervious, aquifer, groundwater, runoff, buffer, storm, flow, percent, reservoir, salt, fresh, supply, water cycle, evaporation, resource, flood, surge, absorb,

Introduction, Day 1:

We know that the surface of the earth is paved in our city. Make a list of all the ways the city has been paved over time. This will connect to the learning they’ve been doing about the history of the city. Why was it paved? Elicit that it was better for transportation to avoid bumps, holes, and mud. Elicit that they even filled in valleys to make it easier to move around.

You’ve named ways paving made things better for people in the city. Today we are going to learn about a problem with all our pavement, and why some people say we need to move past “paving, piping, and polluting” in order to save our water supply. What is the water supply?

Start with what they know about water. Show a picture of New York Harbor.



What type of water is in this picture? Children answer “ocean, or salt.” What about in the sink? Elicit that it is called fresh and that we can only drink fresh. We use only fresh for washing.

How much water on earth is salt and how much is fresh? Take some guesses. To show that 97 per cent of water on earth is salt, pass out 97 pieces of gravel and have the students place them on a 10x10 grid paper in the center of the room. Have a student place three Skittles in the remaining spaces.

Say that scientists have estimated that even though most of the earth’s surface is covered in water, we need to imagine that water in terms of percent. Explain percent, and show that fresh water is like the skittles, salt water is like the gravel. It is not a resource for humans, plants or animals on land.

Print the pictures of the gravel, Skittles display and have the children add them to their science books and write a couple of sentences explaining what the picture shows.

Give out the homework assignment to list places at home where they can get fresh water. Give one child (a volunteer) the assignment of bringing in a pair of clean socks.

Day 2:

Start with reviewing the idea that 3 percent of water on earth is fresh. Show them a pair of clean socks. Explain the idea of a cycle using the socks. When Sandra (for example) goes out to the park and then plays hockey in these socks after school they get very dirty. How can she wear them again? She can wash them and then they’re fine. This is the sock cycle. They get dirty, but then they get clean, and it’s fine to put them on again. Water is the same way. We dirty it all the time, even in our toilets, but then it gets clean and we can use it again, as long as it’s fresh.

If the rain falls into a reservoir upstate that is connected to our pipes, we can get that water back very directly. But even if it falls on the ground, there’s another way we can get it back pretty directly. If the rain falls on to a pervious surface, it can reach a reservoir through a special part of the earth called groundwater.

(Show groundwater video <http://www.leapingmedia.com/groundwater.html>here).

So we can see that pervious surfaces help us safeguard the water supply. What about impervious surfaces? Let’s do some work to compare these two types of surfaces and what happens to the fresh water raining on them.

Demonstrate setting up the roller pan, timer, and watering can to see how quickly water runs into the basin when there is no sponge to absorb it. Have the students repeat the experiment with a sponge in place and compare the time difference (see photos of experiment set up).



Label one side of the meeting area easel pervious buffer and the other side impervious surface.

Use blue food coloring to make the water blue.

Time how long it takes for the basin to fill up. Write your time on a post it and stick it up on the side of the easel marked impervious surface.

Next, we will put a buffer between the pavement and the ocean. What do we have here that would be a pervious surface? What makes it so? Can you use it to make a buffer that would keep the water from filling the ocean so quickly?

See how long it takes the basin to fill up when you use a pervious buffer. Write it on a post it, add to the side of the easel marked pervious buffer.

What is the difference in time?

Record the difference in your notebooks.





Wrap up: show pictures of CSO pipes that empty into the East River, and explain that the water they see running on the pavement in a big rainstorm ends up in sewer pipes like these that dump it into the salty water. During a big storm, the system is designed to move the water off the streets and into the rivers quickly so that we do not have excess water in our way in the city. Elicit from them that was is sacrificed through this process is rain water replenishing groundwater, and that all the dirty street water is ending up in our salty water ways.

Conclusion/Extension

Show the article from Town and Village newspaper about the wetlands plan for the East River and talk about how the buffer can work the other way too, to protect the city from a storm surge in the river, as we had with Hurricane Sandy.

(Wetlands plan from the Villager: http://www.thevillager.com/2013/02/28/stringer-plants-idea-for-wetlands-along-east-river/)

Explain that some scientists say that wetlands are a good filter of pollution, and show that we could test that by running dirty water in the pan with and without the buffer of the sponge. Make building that experiment an optional activity during choice time. Find out if there are other issues about types of surfaces the children would like to test.

(show Sewer in a Suitcase Video about CS0s, vimeo.com/52018694)

Writing

1.Have students fill in the attached chart.

2.Using as many science words as you can write all about the water buffer experiment we completed. What questions do you have about rain water run off and absorption?

Chart to be completed after Day 2.

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| --- | --- | --- | --- |
| Surface | sketch | example | description |
| pervious |  |  |  |
| impervious |  |  |  |